

Towards models with an unified dynamical mechanism for elementary particle masses

Monday, 23 July 2018 15:20 (20 minutes)

Numerical evidence for a new dynamical mechanism of elementary particle mass generation has been found by lattice simulation in a simplified SU(3) gauge model where a SU(2) doublet of strongly interacting fermions is coupled to a complex scalar field doublet via a Yukawa and a Wilson-like term.

We point out that if, as a next step towards the construction of a realistic beyond-the-Standard-Model model, weak interactions are introduced, then also weak bosons get a mass by the very same non-perturbative mechanism. In this scenario (fermion) mass hierarchy can be naturally understood owing to the peculiar gauge coupling dependence of the non-perturbatively generated masses. As a consequence, if one wants to get the top-quark (or the weak bosons) mass at its phenomenological value, the RGI scale of the theory must be much larger than Λ_{QCD} . This feature hints at the existence of new strong interactions and particles at a scale Λ_T of a few TeV. In such a speculative framework the electroweak scale can be derived from the fundamental scale Λ_T and the Higgs boson should arise a bound state in the WW+ZZ channel.

Primary authors: Prof. ROSSI, Giancarlo (Univ. of Rome Tor Vergata and Centro Fermi - Rome); Prof. FREZZOTTI, Roberto (University of Rome "Tor Vergata" and INFN unit of Rome Tor Vergata)

Presenter: Prof. FREZZOTTI, Roberto (University of Rome "Tor Vergata" and INFN unit of Rome Tor Vergata)

Session Classification: Physics beyond the Standard Model

Track Classification: Physics Beyond the Standard Model